Physics (Junior Year)
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Resonance

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Hello Everyone!!!!

Ever wondered how does an Opera Singer is able to break a glass just by singing..

Keep on thinking about it. I'll explain the answer later...

So, To begin with. I wanna define some terms.

A material's Natural Resonant Frequency is the frequency that it likes to vibrate at when disturbed.

Like the Resonant Frequency of Glass is around 575 Hz. So when I strike a glass with something, The glass should vibrate at 575 Hz.

(Explain with a diagram of two waves)

Now, There is a phenomenon where if an initial wave (Say, Wave 1) of let's say 500 Hz encounters another Wave (Say, Wave 2) with the same 500 Hz Frequency, Then Wave 1 will increase in amplitude as more energy is applied to it by Wave 2.

Wave 2 is more commonly known as the driving wave in such scenarios.

So Resonance is basically when a wave encounters an external force of the same frequency as it's natural Resonant frequency. Then the wave's amplitude will increase as energy is added into it by the external force.

Now, Onto the answer to the question I asked in the start..

So, You all must have seen the classic trick of a singer breaking a glass with just their voice. That is also an example of Resonance. The singer has trained themselves to sing out the exact frequency as the Resonant Frequency of the glass. So as the singer sings, the Energy is added into the vibrations of the Glass molecules by their voice and they start vibrating with a greater Amplitude, This keeps on happening until the vibrations becomes so strong that the glass cannot handle it anymore and it shatters.

So, That was my explanation for Resonance. If anyone has any questions regarding this topic then I'm ready to answer...

If not then...

Thanks a lot!!